ED Decision 2010/010/R
14/12/2010
Annex II
ETSO-C155
Date: 21.12.2010

European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: RECORDER INDEPENDENT POWER SUPPLY

1 – Applicability

This ETSO gives the requirements which new models of recorder independent power supply equipment, that are manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

This ETSO applies to equipment intended to provide back-up power to an installed cockpit crash protected recorder, whether it is:

- Voice
- Image
- Data
- Combination voice/data
- Combination voice/image, or
- Combination image/data.

2 - Procedures

2.1. - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

None

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

Standards set forth in **Appendix 1** of this ETSO.

3.1.2 - Environmental Standard

See CS-ETSO Subpart A paragraph 2.1 and **Appendix 2** to this ETSO.

3.1.3 - Computer Software

See CS-ETSO Subpart A paragraph 2.2

3.1.4 Electronic Hardware Qualification.

See CS-ETSO Subpart A paragraph 2.3

3.2 - Specific

3.2.1 Failure Condition Classification

See CS-ETSO Subpart A paragraph 2.4

Failure of the function defined in paragraph 3.1.1 of this ETSO has been determined to be a minor failure condition.

4 - Marking

4.1 - General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2

4.2 – Specific

None

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

APPENDIX 1

MINIMUM PERFORMANCE STANDARD (MPS) FOR RECORDER INDEPENDENT POWER SUPPLY (RIPS)

RIPS supplies direct current (DC) voltage to an aircraft installed recorder for a specified time whenever the primary aircraft power is removed. RIPS ensures continued recording. RIPS supports recorders of cockpit voice, image, combination voice/data, combination voice/image, or combination image/data. RIPS doesn't distinguish between a normal shutdown and loss of electrical power from an emergency. It executes operational cycles regardless of the type of power loss.

In the tables below are standards for RIPS classified by performance requirements:

1. Power Requirements:	
Aircraft Voltage	Operate from either $115V_{AC}$ single phase 360-800Hz variable frequency, or from $27.5V_{DC}$ primary aircraft power, or both (depends on model).
Availability	Power the recorder any time the aircraft's electrical power is removed. Includes normal shutdown

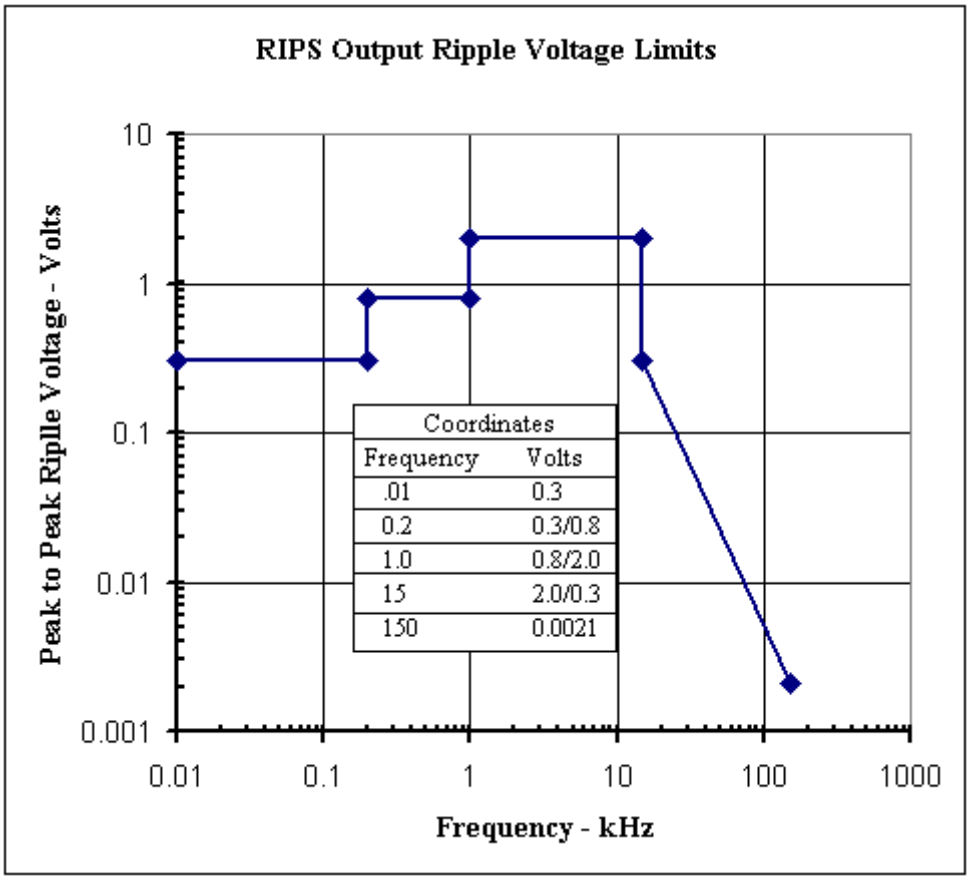
2. RIPS Power output:	
Supplied Voltage	Power the recorder continuously or only after aircraft power is lost. Output voltage should be $27.5V_{DC}$ nominal but can vary from $18V_{DC}$ to $32.2V_{DC}$. Ripple voltage will not exceed limits at **Figure 1** (shown after this table). Output power should be prevented from causing damage when short-circuited. Output power should not be hazardous to personnel during handling.
Energy Requirements	Provide minimum 12 watts for the supply duration. Corresponds to stored energy of 6480 to 7920 watt-seconds (9 to 11 minutes times 60 seconds/minute= 12 watts)
Recharging	Be ready to function within 15 minutes from application or re-application of primary power. Since stored energy could be fully depleted, design the charging system to restore the stored energy source. Restoration should be from any initial charge state, back to the minimum energy level specified above. Unit can provide full 10 minutes of power no more than 15 minutes from aircraft power restoration. Recharge time required for unit to provide 6 minutes of power: not more than 10 minutes

3. Built In Monitoring:	Be equipped with built-in test equipment (BITE) to detect internal failures and to monitor the unit's condition. If maintenance is required based on any combination of the following aspects, monitor and log the maintenance: - Energy source life expiration (number of hours operating time until battery replacement), - Other energy source failure, - - Absence of energy source in the device, and - - Number of energy source cycles Manufacturers may add other operational aspects

4. Maintenance Warning:	Issues a warning as discrete output, alerting of any inability to perform the intended function or that maintenance is required. To do this, RIPS provides an output that indicates: - A fail condition with an OPEN circuit. Resistance greater than 100,000 ohms or voltage greater than 18 V_{DC} (36V_{DC} Max), and - A normal operation by a standard GROUND. V_{OUT} less than 3.5 V_{DC}

5. Operational Timing:	Monitors the line voltage supplied to the recorder. When aircraft power is lost, the RIPS restores power to recorder from its stored energy no more than 50 milliseconds after the line voltage falls below the specified recorder minimum operating voltage (18 V_{DC} or 100 V_{AC})
Tolerance	Tolerance on the 10 minute output is ± 1 minute
Operational Reset	If input power to RIPS is restored before the 10 minute period ends, RIPS should reset the 10 minute timer to 0 and resume monitoring the recorder line voltage. The RIPS should recharge as required (see "Recharging," above)

Figure 1 – DC Ripple Voltage Limits



APPENDIX 2

ENVIRONMENTAL QUALIFICATION EQUIPMENT CATEGORY/CLASS

Environmental Qualification	ED-14() Category or class
Audio Frequency Conducted Susceptibility--Power Inputs	Category A(WF)
Emission of Radio Frequency Energy	Category M
Explosion Proof	Category E for equipment intended for use in Environment II
Fluids Susceptibility	Category F
Fungus Resistance	Category F
Humidity	Category A
Induced Signal Susceptibility	Category C
Lightning Induced Transient Susceptibility	Category A2C3
Magnetic Effect	Class Z
Operational Shocks and Crash Safety	Category B
Power Input	Category A(WF), AC, and DC supply
Radio Frequency Susceptibility (Radiated and Conducted)	Category V
Temperature and Altitude	Category D2
Temperature Variation	Category B. Test the control electronics over the entire temperature range. Test the energy source from a lower test limit of -20° C to the upper test limit
Vibration	Category H, curve C1, and Y equipment
Voltage Spike	Category A
Waterproof	Category W